



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

**Purdue University Agricultural Experiment Station
and U.S.D.A., A.R.S.**

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *seventeen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS SEED OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (34 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'Downy'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington this 14th day of June in the year of our Lord one thousand nine hundred and seventy-seven

Attest:

L. E. Rollin
Commissioner
Plant Variety Protection Office
Grain Division
Agricultural Marketing Service

Bob Berglund
Secretary of Agriculture



APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

INSTRUCTIONS: See Reverse.

| | | | |
|--|---|---|---|
| 1a. TEMPORARY DESIGNATION OF VARIETY | 1b. VARIETY NAME DOWNY | FOR OFFICIAL USE ONLY PV NUMBER 7700048 | |
| 2. KIND NAME Wheat | 3. GENUS AND SPECIES NAME <u>Triticum aestivum</u> | FILING DATE 2-9-77 | TIME 3:30 A.M. P.M. |
| 4. FAMILY NAME (BOTANICAL) Gramineae | 5. DATE OF DETERMINATION January 1, 1976 | FEE RECEIVED \$ 250.00 \$ 250.00 \$ 250.00 | DATE 2-9-77 3-11-77 6-13-77 |
| 6. NAME OF APPLICANT(S) Purdue University Agricultural Experiment Station and USDA - ARS | 7. ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code) Agricultural Administration Bldg. Purdue University West Lafayette, Indiana 47907 Washington, D.C. 20250 | | 8. TELEPHONE AREA CODE AND NUMBER 317-749-6005 |
| 9. IF THE NAMED APPLICANT IS NOT A PERSON, FORM OF ORGANIZATION: (Corporation, partnership, association, etc.) | | 10. IF INCORPORATED, GIVE STATE AND DATE OF INCORPORATION | 11. DATE OF INCORPORATION |

12. Name and mailing address of applicant representative(s), if any, to serve in this application and receive all papers:

Dr. B. J. Liska, Director
Agricultural Experiment Station
Purdue University
West Lafayette, Indiana 47907

13. CHECK BOX BELOW FOR EACH ATTACHMENT SUBMITTED:

- ☒ 13A. Exhibit A, Origin and Breeding History of the Variety (See Section 52 of the Plant Variety Protection Act.)
- ☒ 13B. Exhibit B, Novelty Statement.
- ☒ 13C. Exhibit C, Objective Description of the Variety (Request form from Plant Variety Protection Office.)
- ☒ 13D. Exhibit D, Additional Description of the Variety.

14A. Does the applicant(s) specify that seed of this variety be sold by variety name only as a class of certified seed?
(See Section 83(a). (If "Yes," answer 14B and 14C below.) ☒ YES ☐ NO

14B. Does the applicant(s) specify that this variety be limited as to number of generations?

☒ YES ☐ NO

14C. If "Yes," to 14B, how many generations of production beyond breeder seed?

☒ FOUNDATION☒ REGISTERED☒ CERTIFIED

15. Does the applicant(s) agree to the publication of his/her (their) name(s) and address in the Official Journal?

☒ YES ☐ NO

16. The applicant(s) declare(s) that a viable sample of basic seed of this variety will be deposited upon request before issuance of a certificate and will be replenished periodically in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Act.

00001

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

(DATE)

(DATE)

(SIGNATURE OF APPLICANT)

(SIGNATURE OF APPLICANT)

12A. Exhibit A. Origin and Breeding History of Downy Wheat

Downy (CI 17,421) was developed at the Purdue University Agricultural Experiment Station in cooperation with the Agricultural Research Service, United States Department of Agriculture.

Downy was previously designated as Purdue 6922A1-16 Composite. Its parentage is: Abe sib/3/Arthur 71 sib/2/CI 9321/Beau sib. It represents the third cycle of crosses designed to transfer leaf pubescence from the CI 9321 parent to adapted Arthur type wheats. The backcross to Arthur 71 sib was made using a selected F_4 plant. The final backcross to the Abe sib was made using a selected F_1 plant. In each crossing cycle, selection was based upon density of leaf pubescence.

Selection of Downy itself was also based upon leaf pubescence. The A1 F_1 plant was selected based upon microscopic observation of leaf pubescence density. The -16 F_2 plant was selected under field conditions for freedom from cereal leaf beetle feeding damage. It was tested again in the F_3 and F_4 generations. A series of selections were made from it in the F_5 generation for eventual compositing to form the Breeders Pure Seed.

The Breeders Pure Seed was in the F_7 generation of selfing. Downy was checked in detail for uniformity especially in regard to the leaf pubescence character. Additionally, a natural field test to Hessian fly occurred which enabled selection for resistance to this pest. Resistance is derived from the Abe sib and Arthur 71 sib parents which both possess the H_5 gene for resistance.

77-48

March 24, 1977

WHEAT APPLICATION NO. 7700048 ('DOWNY')

Amendment to Original Exhibit A

The pedigree of Downy is Purdue 6922A1-16. The "A1" designates one F_1 plant. The "-16" represents a single F_2 plant derived from the selfing of F_1 plant 6922 A1.

Downy is generally similar to Arthur in milling and baking qualities (Table 2). Downy was superior to Arthur in cookie top grain in these tests (Table 2).

00003

March 24, 1977

Table 2. Quality of Wheat Nursery Samples Tested at the Soft Wheat Quality Laboratory, Wooster, Ohio, 2-year av., 1974 and 1975.

| Character | Downy | Arthur |
|---------------------|-------|--------|
| Test weight | 61.4 | 62.5 |
| Wheat protein (%) | 11.7 | 12.0 |
| Pearling index | 41.6 | 44.3 |
| Particle size index | 19.0 | 20.5 |
| Flour yield (%) | 68.0 | 66.3 |
| Flour ash (%) | 0.47 | 0.46 |
| Flour protein (%) | 10.4 | 11.0 |
| AWRC | 55.6 | 54.8 |
| Cookie diameter | 17.9 | 18.1 |
| Cookie top grain | 7.5 | 5.0 |

The most novel characteristic of Downy is its resistance to the cereal leaf beetle. Table 1 shows Downy compared to Arthur, Arthur 71, and Abe under field conditions at New Carlisle, Indiana in 1974 and 1975 and the relative densities of leaf pubescence for all four varieties.

Table 1. Cereal leaf beetle feeding damage, New Carlisle, Indiana
0 = none to 4 = maximum.

| | 1974 | 1975 | hairs/mm ² |
|-----------|------|------|-----------------------|
| Downy | 1 | 1 | 100 |
| Arthur | 4 | 4 | 40 |
| Arthur 71 | 3 | 4 | 30 |
| Abe | 3 | 4 | 30 |

Downy is most like the Arthur variety (except for leaf pubescence).

March 24, 1977

WHEAT APPLICATION NO. 7700048 ('DOWNY')

Amendment to Original Exhibit ^D_{KRC}

There are four released cultivars derived from Arthur by the backcross method of breeding. They are Arthur 71, Abe, Oasis, and Beau. All are of the general "Arthur type" in general appearance and adaptation. They are different from Arthur in specific characters as has been documented in applications for Variety Protection.

Downy is different from Arthur, Arthur 71, Abe, Oasis, and Beau in leaf pubescence of about 100 hairs/mm² on the flag leaf contrasted to 30 to 40 hairs/mm² for Arthur, Arthur 71, Abe, Oasis and Beau.

Breeder's Seed of Downy was formed by compositing a large group of F₅ generation plant progenies verified for the dense leaf pubescence. Downy bred true for all characters in the F₆ and F₇ generations of Breeder's Seed production from self-pollination.

There has been no variant type observed.

1161 6 831
1977
03:30

INSTRUCTIONS

GENERAL: Send an original copy of the application, exhibits and \$250.00 fee to U.S. Dept. of Agriculture, Agricultural Marketing Service, Grain Division, National Agricultural Library, Beltsville, Maryland 20705. (See Section 180.175 of the regulations and rules of practice.) Retain one copy for your files. All items on the face of the form are self-explanatory unless noted below.

ITEM

- 5 Give the date the applicant determined that he had a new variety based on (1) the definition in Section 41(a) of the Act and (2) the date a decision was made to increase the seed.
- 13a Give (1), the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method. (2), the details of subsequent stages of selection and multiplication. (3), the type and frequency of variants during reproduction and multiplication and state how these variants may be identified and (4), evidence of stability.
- 13b Give a summary statement of the variety's novelty. Clearly state how this novel variety may be distinguished from all other varieties in the same crop. If the new variety most closely resembles one or a group of related varieties; (1) identify these varieties and state all differences objectively; (2) Attach statistical data for characters expressed numerically and demonstrate that these differences are significant; and (3) submit, if helpful, seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty.
- 13c Fill in the Exhibit C, Objective Description form for all characteristics, for which you have adequate data.
- 13d Describe any additional characteristics that are not described, or whose description cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the description of characteristics that are difficult to describe; such as; plant habit, plant color, disease resistance, etc.
- 14A If "YES" is specified (seed of this variety be sold by variety name only as a class of certified seed) the applicant may NOT reverse his affirmative decision after the variety has either been sold and so labeled or published or the certificate has been issued. However, if the applicant specifies "NO", he may change his choice. (See Section 180.15 of the Regulations and Rules of Practice.)

'Downy'

77-48

11. HEAD:

| | | | |
|----------------------------|--|----------------------------|--|
| <input type="checkbox"/> 1 | Density: 1 = LAX 2 = DENSE | <input type="checkbox"/> 2 | Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) _____ |
| <input type="checkbox"/> 2 | Awnedness: 1 = AWNLESS 2 = APICALLY AWNL 3 = AWNLETED 4 = AWNED | | |
| <input type="checkbox"/> 2 | Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED 5 = BROWN 6 = BLACK 7 = OTHER (Specify) _____ | | |
| <input type="checkbox"/> 0 | <input type="checkbox"/> 8 | CM. LENGTH | <input type="checkbox"/> 1 <input type="checkbox"/> 2 |
| | | | MM. WIDTH |

12. GLUMES AT MATURITY:

| | | | |
|----------------------------|--|----------------------------|---|
| <input type="checkbox"/> 2 | Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.) 3 = LONG (CA. 9 mm.) | <input type="checkbox"/> 2 | Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.) 3 = WIDE (CA. 4 mm.) |
| <input type="checkbox"/> 1 | 1 Glabrous 2 Pubescent | | |
| <input type="checkbox"/> 3 | Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE | | |
| <input type="checkbox"/> 1 | Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE | | |

13. COLEOPTILE COLOR:

☐ 1 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

☐ 1 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

☐ 2 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

| | | | |
|----------------------------|--|----------------------------|---|
| <input type="checkbox"/> 1 | Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL | <input type="checkbox"/> 1 | Cheek: 1 = ROUNDED 2 = ANGULAR |
| <input type="checkbox"/> 2 | Brush: 1 = SHORT 2 = MEDIUM 3 = LONG | <input type="checkbox"/> 1 | Brush: 1 = NOT COLLARED 2 = COLLARED |
| <input type="checkbox"/> 4 | Phenol reaction (See instructions): 1 = IVORY 2 = FAWN 3 = LT. BROWN 4 = BROWN 5 = BLACK | | |
| <input type="checkbox"/> 3 | Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) _____ | | |
| <input type="checkbox"/> 0 | <input type="checkbox"/> 5 | MM. LENGTH | <input type="checkbox"/> 0 <input type="checkbox"/> 3 |
| | | | MM. WIDTH |
| <input type="checkbox"/> 3 | <input type="checkbox"/> 0 | GM. PER 1000 SEEDS | |

17. SEED CREASE:

| | | | |
|----------------------------|--|----------------------------|--|
| <input type="checkbox"/> 1 | Width: 1 = 60% OR LESS OF KERNEL 'WINOKA' 2 = 80% OR LESS OF KERNEL 'CHRIS' 3 = NEARLY AS WIDE AS KERNEL 'LEMHI' | <input type="checkbox"/> 2 | Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT' 2 = 35% OR LESS OF KERNEL 'CHRIS' 3 = 50% OR LESS OF KERNEL 'LEMHI' |
|----------------------------|--|----------------------------|--|

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

| | | | | | | | |
|----------------------------|-------------------|----------------------------|-------------------|----------------------------|-----------------------------------|----------------------------|------------|
| <input type="checkbox"/> 2 | STEM RUST (Races) | <input type="checkbox"/> 2 | LEAF RUST (Races) | <input type="checkbox"/> 0 | STRIPE RUST (Races) | <input type="checkbox"/> 0 | LOOSE SMUT |
| <input type="checkbox"/> 2 | POWDERY MILDEW | <input type="checkbox"/> 0 | BUNT | <input type="checkbox"/> 1 | OTHER (Specify) <u>S. tritici</u> | | |

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

| | | | | | | | |
|----------------------------|-----------------------|----------------------------|---------------|----------------------------|-----------|----------------------------|--------------------|
| <input type="checkbox"/> 0 | SAWFLY | <input type="checkbox"/> 0 | APHID (Bydv.) | <input type="checkbox"/> 0 | GREEN BUG | <input type="checkbox"/> 2 | CEREAL LEAF BEETLE |
| <input type="checkbox"/> | OTHER (Specify) _____ | HESSIAN FLY RACES: } | | <input type="checkbox"/> 2 | GP | <input type="checkbox"/> 2 | A |
| | | | | <input type="checkbox"/> 2 | D | <input type="checkbox"/> 2 | E |
| | | | | <input type="checkbox"/> 2 | F | <input type="checkbox"/> 2 | G |

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

| CHARACTER | NAME OF VARIETY | CHARACTER | NAME OF VARIETY |
|-----------------|-----------------|-----------------------|-----------------|
| Plant tillering | Arthur | Seed size | Arthur 71 |
| Leaf size | Arthur | Seed shape | Arthur 71 |
| Leaf color | Arthur 71 | Coleoptile elongation | Arthur |
| Leaf carriage | Arthur | Seedling pigmentation | Arthur |

INSTRUCTIONS

00008

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

- (a) L.W. Briggie and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States, Technical Bulletin 1278, United States Department of Agriculture.
- (b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. (See attachment.)

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety.

Downy is a common soft red winter wheat, Triticum aestivum L.

Downy was like Arthur in flowering date in nursery trials at Lafayette in 1975. At normal seeding time, average first flowering is 227 days after emergence with last flowering 7 days later.

The average height of Downy is 93 cm, the same as Arthur and Arthur 71.

The plant color at booting is green like Arthur 71.

The anther color is yellow like Arthur 71.

The stem has no anthocyanin present and does have a waxy bloom. The last internode of the rachis has no hair and the internodes are hollow.

The auricles lack anthocyanin and are hairy.

Flag leaves of Downy are erect and generally not twisted. The flag leaf sheath has a waxy bloom. The first leaf sheath is hairy. All leaves of Downy possess a dense leaf pubescence. On the flag leaf at heading, there are approximately 100 hairs per mm², compared to 30 hairs per mm² for Arthur 71. This morphological character is the source of resistance to the cereal leaf beetle. These leaf hairs have also been shown in greenhouse trials to be effective in resistance to Hessian fly and the oat bird cherry aphid.

The spikes are lax, strap-shaped, apically-awnletted and yellow at maturity. They average 8 cm in length and 12 mm in width.

Mature glumes are medium length and width, with generally rounded shoulders and obtuse beaks.

Coleoptile color is white.

There is no seedling anthocyanin.

Juvenile plant growth habit is semi-erect.

Downy's seed is red, ovate in shape with rounded cheeks. The brush is medium length and not collared. The kernels average 5 mm in length and 3 mm in width and weigh 30 g per 1000. The phenol reaction is dark brown.

Downy is similar to Arthur in resistance to leaf and stem rust and powdery mildew. It is resistant to the cereal leaf beetle and to most races of the Hessian fly.



77-48
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL MARKETING SERVICE
14th and Independence Avenue, Rm. 1634

WASHINGTON, D.C. 20250

PLANT VARIETY PROTECTION OFFICE

Gentlemen:

Subject: Application No. 7700048
Variety and Kind - 'Downy' - Wheat

As provided in section 83(a) of the Plant Variety Protection Act, 7 U.S.C. 2321, we request that the Certificate on the above variety be issued with a notation on each Certificate that the right to exclude others from selling, offering for sale, reproducing, importing or exporting the variety covered by this Certificate, or using it in producing a hybrid or different variety is waived.

It has been agreed that the certificate should be issued in the name(s) of:

Purdue University Agricultural Experiment Station

and the United States Department of Agriculture

4/25
(Date)

[Signature]
(Signature)

00010

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (TRITICUM SPP.)

INSTRUCTIONS: See Reverse.

NAME OF APPLICANT(S)

FOR OFFICIAL USE ONLY

Purdue University, Agricultural Exp. Station & USDA-ARS

PVPO NUMBER

7700048

ADDRESS (Street and No. or R.F.D. No., City, State, and ZIP Code)

VARIETY NAME OR TEMPORARY
DESIGNATIONAgricultural Administration Building
West Lafayette, Indiana 47907

Downy

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g., or) when number is either 99 or less or 9 or less.

1. KIND:

 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:

 1 = SPRING 2 = WINTER 3 = OTHER (Specify) _____ 1 = SOFT 3 = OTHER (Specify) _____
2 = HARD 1 = WHITE 2 = RED 3 = OTHER (Specify) _____

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:

 FIRST FLOWERING LAST FLOWERING

4. MATURITY (50% Flowering):

 NO. OF DAYS EARLIER THAN 1 = ARTHUR 2 = SCOUT 3 = CHRIS NO. OF DAYS LATER THAN 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT (From soil level to top of head):

 CM. HIGH CM. TALLER THAN 1 = ARTHUR 2 = SCOUT 3 = CHRIS CM. SHORTER THAN 4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING (See reverse):

 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHUR COLOR:

 1 = YELLOW 2 = PURPLE

8. STEM:

 Anthocyanin: 1 = ABSENT 2 = PRESENT Waxy bloom: 1 = ABSENT 2 = PRESENT Hairiness of last
internode of rachis: 1 = ABSENT 2 = PRESENT Internodes: 1 = HOLLOW 2 = SOLID NO. OF NODES (Originating from node above ground) CM. INTERNODE LENGTH BETWEEN FLAG LEAF
AND LEAF BELOW

9. AURICLES:

 Anthocyanin: 1 = ABSENT 2 = PRESENT Hairiness: 1 = ABSENT 2 = PRESENT

10. LEAF:

 Flag leaf at
booting stage: 1 = ERECT 2 = RECURVED
3 = OTHER (Specify) _____ Flag leaf: 1 = NOT TWISTED 2 = TWISTED Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT MM. LEAF WIDTH (First leaf below flag leaf) CM. LEAF LENGTH (First leaf below flag leaf)

00007